SUNY at Buffalo QuarkNet Center

Annual Report 2012

SUNY at Buffalo (UB) has joined QuarkNet in early 2006. Mentors of the group are UB experimental High Energy Physicists, Prof. Ia Iashvili and Prof. Avto Kharchilava. UB Experimental HEP group has sponsored its 6th annual QuarkNet Summer Workshop in Buffalo during August 22-24. This year we had 5 teachers taking part in the Workshop: two lead teachers (David McClary and Larry Hiller) and three participating teachers. The teachers are from 4 different schools, 2 of which are public schools and the other 2 are private.

The workshop had the following format: the first two days were dedicated to the CMS e-lab workshop facilitated by Mr. Thomas Loughran of Notre Dame. The teachers analyzed CMS J/psi->mumu decays and studied the CMS muon system resolution in the barrel versus the endcaps. The corresponding e-lab poster, created by the teachers, appears as "A resolution Comparison of the Barrel and the End Caps in the CMS Detector" in the e-lab portal. During day 3, the center mentors Prof. Kharchilava and Prof. Iashvili gave talks on CMS Higgs analyses that led to the Higgs discovery earlier this year. On the same day, our lead teacher, Larry Hiller of Nichols school gave demonstration on track detection and reconstruction using a model of stereo tracking device built by a Nichols High School student. The device has planes of "wire" made of perpendicularly stretched clear light-guides which are read out by a photo-detectors. The "particle track" is simulated by a laser beam, and the read-out gives signal of the fired "wires". The analyses program written in the PYTHON reconstructs and displays "tracks" in 3D. The device is very good demonstration of the concept of tracking in HEP.

Earlier this year, on March 10, UB Quarknet center participated in the CMS Masterclass. Twelve students from two high schools were divided into six groups to analyze Z->ee, Z->mumu, W->enu and W->munu events using CMS event display. Different groups analyzed different batches of data, and compared their findings. At the end of the data analyses session, students combined their data to measure relative fraction of Z events compared to W events, and to check lepton universality. They have also created distributions of various quantities. Finally, students prepared presentation based on their results and gave presentation over Vidyo with other participating Masterclass groups present (Detroit, Baltimore and Minneapolis). Students found Masterclass experience useful and informative about HEP as a whole and about the collaborative nature of the HEP experimental research.

Mentors: Ia Iashvili, Avto Kharchilava